CLAIMS

We claim:

1. A method of reducing a dimension of a nanowire comprising:

depositing a nanowire on a first dielectric layer formed on a substrate, said nanowire having a first dimension;

depositing a sacrificial gate stack having a sacrificial dielectric layer and a sacrificial gate electrode layer over a first region of said nanowire leaving exposed a second region and a third region of said nanowire;

depositing a first spacer on each side of said sacrificial gate stack;

depositing a second dielectric layer over said first dielectric layer to cover said second region and third region;

removing said sacrificial gate stack; and

thinning said first region of said nanowire by at least one thermal oxidation process and oxide removal process to thin said first region from said first dimension to a second dimension.

2. The method of claim 1 wherein said depositing said second dielectric layer is a blanket deposition wherein said second dielectric layer is further polished to exposed said sacrificial gate electrode.

3. The method of claim 1 further comprising:

depositing a second spacer on each side of said first spacer prior to said depositing said second dielectric layer.

4. The method of claim 1 further comprising:

forming an epitaxial film over said second region and third region of said nanowire prior to said depositing said second dielectric layer.

5. The method of claim 1 wherein said thinning said first region further comprises:

sequentially growing oxide layers on said first region by said thermal oxidation and etching away said oxide layers using a buffered oxide etchant until said second dimension reach a desired value.

6. The method of claim 1 wherein said second dimension is at least ten folds smaller than said first dimension.

7. The method of claim 1 further comprising:

forming a silicide layer over each of said second region and third region of said nanowire prior to depositing said dielectric layer.

8. The method of claim 1 further comprising:

implanting dopants into each of said second region and third region of said nanowire to form source/drain regions prior to said depositing said dielectric layer.

9. A method of fabricating a nanowire having a comprising:

depositing a nanowire on a first dielectric layer formed on a substrate, said nanowire having a first dimension;

depositing a sacrificial dielectric layer over a first region of said nanowire and an etchable sacrificial layer over said sacrificial dielectric layer leaving exposed a second region and a third region of said nanowire, (said first region defining a channel region for said nanowire);

depositing a first spacer on each side of said sacrificial dielectric layer and said etchable sacrificial layer;

depositing a second dielectric layer over said first dielectric layer to cover said second region and third region;

etching away said etchable sacrificial layer and said sacrificial dielectric layer; and

thinning said first region of said nanowire by at least one thermal oxidation process and oxide removal process to thin said first region from said first dimension to a second dimension.

10. The method of claim 9 further comprising:

depositing a second spacer on each side of said first spacer prior to said depositing said second dielectric layer.

11. The method of claim 9 further comprising:

forming an epitaxial film over said second region and third region of said nanowire prior to said depositing said second dielectric layer.

12. The method of claim 9 wherein said thinning said first region further comprises:

sequentially growing oxide layers on said first region by said thermal oxidation and etching away said oxide layers using a buffered oxide etchant.

13. The method of claim 9 wherein said second dimension is at least ten folds smaller than said first dimension.

14. The method of claim 9 further comprising:

forming a silicide layer over each of said second region and third region of said nanowire prior to said depositing said second dielectric layer.

15. The method of claim 9 further comprising:

implanting dopants into each of said second region and third region of said nanowire to form source/drain regions prior to depositing said second dielectric layer.

16. A method of fabricating an electronic device comprising:

depositing a nanowire on a first dielectric layer formed on a substrate, said nanowire having a first dimension;

depositing a sacrificial dielectric layer over a first region of said nanowire and an etchable sacrificial layer over said sacrificial dielectric layer leaving exposed a second region and a third region of said nanowire, said first region defining a channel region for said electronic device;

depositing a first spacer on each side of said sacrificial dielectric layer and said etchable sacrificial layer;

forming a source/drain region in each of said second region and said third region;

depositing a second dielectric layer over said first dielectric layer to cover said second region and third region;

etching away said etchable sacrificial layer and said sacrificial dielectric layer;

thinning said first region of said nanowire by at least one thermal oxidation process and oxide removal process to thin said first region from said first dimension to a second dimension; and

depositing a device gate stack over said first region, said device gate stack including a third dielectric layer and a gate electrode.

17. The method of claim 16 further comprising:

forming contact to said source/drain region.

18. The method of claim 16 further comprising:

depositing a second spacer on each side of said first spacer prior to said depositing said second dielectric layer.

19. The method of claim 16 further comprising:

forming an epitaxial film over said second region and third region of said nanowire prior to said depositing said second dielectric layer.

20. The method of claim 16 wherein said forming said source/drain region further comprises:

forming an epitaxial film over each of said second region and third region of said nanowire;

implanting a dopant into said second region and said third region; and

forming a silicide layer over said epitaxial film.

21. The method of claim 16 further comprising:

forming a silicide layer over each of said second region and third region of said nanowire prior to said depositing said second dielectric layer.

22. The method of claim 16 further comprising:

implanting dopants into each of said second region and third region of said nanowire to form source/drain regions prior to depositing said second dielectric layer.

23. The method of claim 16 wherein said thinning said first region further comprises:

sequentially growing oxide layers on said first region by said thermal oxidation and etching away said oxide layers using a buffered oxide etchant.

24. The method of claim 16 wherein said second dimension is at least ten folds smaller than said first dimension.

25. The method of claim 16 wherein said etchable sacrificial layer comprises silicon or polysilicon.

26. An electronic device comprising:

a nanowire formed on a first dielectric layer formed on a substrate, said nanowire having a channel region, a first source/drain region, and a second source/drain region, said channel region being substantially smaller than each of said first source/drain region, and said second source/drain region;

a device gate stack formed over said channel region;

a first spacer formed on each side of said device gate stack; and

a second dielectric layer formed over said first dielectric layer, said first source/drain region, and said second source/drain region.

27. An electronic device as in claim 26 further comprising:

a second spacer formed on each side of said first spacer.

28. An electronic device as in claim 26 further comprising:

an epitaxial layer formed over each of said first source/drain region, and said second source/drain region to increase dimensions of said first source/drain region, and said second source/drain region.

29. An electronic device as in claim 26 wherein said dielectric layer further comprises:

contact vias to allow to each of said first source/drain region and said second source/drain region.